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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,646	07/22/2003	Chia-Chen Chen	0941-0794P	4737

2292 7590 05/30/2006

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EXAMINER	
BROOME, SAID A	
ART UNIT	**PAPER NUMBER**
2628	

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/623,646	CHEN ET AL.	
	Examiner	Art Unit	
	Said Broome	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 September 2002.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. ("Fast head modeling for animation") in view of Migdal et al.(US Patent 6,208,347).

Regarding claim 1, Lee et al. teaches all the limitations except determining and redetermining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads and producing a regular triangular grid sample model according to the 3D threads. Lee et al. teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation on page 1 first paragraph lines 1-5 ("We present a method to reconstruct 3D facial model for animation… from range data obtained from any available resources. It is based on extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points.") comprising using a computer to perform the steps of: (a) inputting original 3D model data, on page 2 section 2 first paragraph lines 1-2 ("…to give an animation structure to a given range data.") and in Figure 1 where it original 3D data input is shown; (b) building 3D feature-lines according to the original 3D model data, as shown in Figure 3(b); (c) converting the 3D feature-lines into 3D threads having respective pluralities of connection joints, connection lines, and loops, on page 3 section 2.2 first paragraph lines 6-9 ("To get correspondence between points from pictures and points on a generic model, which has

a defined number, a snake is a good candidate. Above the conventional snake, we add some more functions called as structure snake, which is useful to make correspondences between points on a front view and ones on a side.") and as shown in Figure 3(b); and (f) projecting the regular triangular grid sample model into the original 3D model to produce a reconstructed 3D model, on page 1 first paragraph lines 1-8 ("...extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points. Then the fine modifications follow if range data is available...The reconstructed 3D-face can be animated immediately...") and on page 6 section 2.3.2 first paragraph lines 1-6 and page 7 lines 8-9 ("Some of feature points are chosen for a fine modification... We collect feature points only when their positions on a modified head are inside certain limitation of corresponding points on original range data. Then we calculate Voronoi triangles of chosen feature points...Figure 5 (c) is the final result after fine modification."), where it is described that the captured feature points forming the triangular gird of Figure 5(a) is projected into the original model of Figure 4(a) in order to generate the reconstructed model of Figure 5(c). Again, Lee et al. fails to teach determining and redetermining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads, and producing a regular triangular grid sample model according to the 3D threads. Migdal et al. teaches (d) determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads, in column 22 lines 38-47("...as 6D data points are added to or removed from the mesh, the faces of the mesh change. When those faces are changed, values calculated for any 6D data points associated with the face can change...When such alterations occur, the computer system 3 must calculate new values for the affected 6D data points or rearrange their associations with particular mesh faces.") and in

column 27 lines 22-26 ("...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density..."), where it is described that the number of points, as well the density that is directly affected by the sample numbers of those points, are determined for the displayed mesh; (e) producing a regular triangular grid sample model according to the 3D threads, in column 7 lines 42-45 ("The use of the complex data points allows the modeling system to incorporate into the wire frame mesh both the spatial features of the object..."); and (g) redetermining sample numbers for each connection line, readding or redeleting the loops, and repeating steps (e) and (f) if the reconstructed 3D model does not satisfy resolution requirements, and outputting the reconstructed 3D model if the reconstructed 3D model satisfies the resolution requirements, in column 27 lines 22-40 ("...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density of resolution. When the system adds a point to the mesh, a reference to the point is added to the insert list 150 (FIG. 3)..."), where it is described that the density of the mesh is continually calculated or redetermined until the desired resolution is reached. It would have been obvious to one of ordinary skill in the art to combine the teachings of Lee et al. with Migdal et al. because this combination would provide efficient reconstruction of a 3D model through acquiring feature points, instead a large amount of mesh data, and producing a reconstructed 3D model from a regular grid formed based on the feature data.

Regarding claim 2, Lee et al. teaches that the 3D feature-lines in step (b) are based on the exterior appearance and structure of the original 3D model on page 2 second paragraph lines 1-4 ("...a fast method applied to two kinds of input to get an animatable cloning of a person. A

semiautomatic feature detection is described to get rough shape of a given face from orthogonal picture data or range data…"), and can be seen in the transition of Figure 1 from the range data to the feature extraction section.

Regarding claim 3, Lee et al. teaches searching the connection lines on page 3 section 2.2 first paragraph lines ("We provide a semi-automatic feature point extraction method with a user interface… Above the conventional snake, we add some more functions called as structure snake, which is useful to make correspondences between points on a front view and ones on a side."), where it is described that the feature points are detected from the input data, therefore all the feature points are searched and then utilized to construct closed zones as the loops which are shown in Figure 3(b). Though Lee et al. teaches generated feature lines in Figures 3(b) and 4(b), Lee et al. fails to teach obtaining intersection points of the 3D feature-lines as the connection joints and recording the connection lines connecting to each connection joint. Migdal et al. teaches obtaining intersection points of the 3D feature-lines as the connection joints in column 12 lines 27-41 ("For 3D mesh constructions, FIG. 1 depicts a plurality of data points 2a (which can be a "cloud of points" or a mesh with some connectivity information…the plurality of data points 2a will also have connectivity or other additional data associated with it…"), where it is described that all the points comprised in mesh are obtained along with their respective connectivity information, which would describe how the points and their respective connection lines are interconnected. Migdal et al. also teaches recording the connection lines connecting to each connection joint in column 9 lines 26-29 ("…the "connectivity" of the mesh or the interconnection of the edges...") and in column 19 lines 35-40 ("The mesh data structure 144 maintains information for each mesh face, its vertices, edges and neighboring faces. The mesh

data structure 144 contains a plurality of face records (e.g., 145)...“), where it is described that the connection lines, or edges are stored for the mesh. The motivation to combine the teachings of Lee et al. and Migdal et al. is equivalent to the motivation of claim 1.

Regarding claim 4, Lee et al. illustrates combined closed regular triangular grids of the loops as the regular triangular grid sample model in Figure 5(a). Lee et al. fails to teach constructing regular triangular grids in each loop according to the sample numbers of each connection line in step (d), in column 27 lines 22-26 (“...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density...“), where it is described that triangular grids are continually formed by inserting points into the grid based on the density or sample numbers of the mesh, as also shown in the transition from Figures 2c to 2d. The motivation to combine the teachings of Lee et al. and Migdal et al. is equivalent to the motivation of claim 1.

Regarding claim 5, Lee et al. teaches all the limitations except determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads and producing a regular triangular grid sample model according to the 3D threads. Lee et al. teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation on page 1 first paragraph lines 1-5 (“We present a method to reconstruct 3D facial model for animation... from range data obtained from any available resources. It is based on extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points.“) comprising using a computer to perform the steps of: inputting original 3D model data, on page 2 section 2 first paragraph lines 1-2 (“...to give an animation structure to a given range data.“) and in Figure 1 where it original 3D data input is shown; building 3D

feature-lines according to the original 3D model data, as shown in Figure 3(b); converting the 3D feature-lines into 3D threads having respective pluralities of connection joints, connection lines, and loops, on page 3 section 2.2 first paragraph lines 6-9 ("To get correspondence between points from pictures and points on a generic model, which has a defined number, a snake is a good candidate. Above the conventional snake, we add some more functions called as structure snake, which is useful to make correspondences between points on a front view and ones on a side.") and as shown in Figure 3(b); and projecting the regular triangular grid sample model into the original 3D model to produce a reconstructed 3D model, on page 1 first paragraph lines 1-8 ("...extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points. Then the fine modifications follow if range data is available...The reconstructed 3D-face can be animated immediately...") and on page 6 section 2.3.2 first paragraph lines 1-6 and page 7 lines 8-9 ("Some of feature points are chosen for a fine modification... We collect feature points only when their positions on a modified head are inside certain limitation of corresponding points on original range data. Then we calculate Voronoi triangles of chosen feature points...Figure 5 (c) is the final result after fine modification."), where it is described that the captured feature points forming the triangular gird of Figure 5(a) is projected into the original model of Figure 4(a) in order to generate the reconstructed model of Figure 5(c). Again, Lee et al. fails to teach determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads, and producing a regular triangular grid sample model according to the 3D threads. Migdal et al. teaches determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads, in column 22 lines 38-47("...as 6D data points are added to or removed from the mesh, the faces of

the mesh change. When those faces are changed, values calculated for any 6D data points associated with the face can change...When such alterations occur, the computer system 3 must calculate new values for the affected 6D data points or rearrange their associations with particular mesh faces.") and in column 27 lines 22-26 ("...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density..."), where it is described that the number of points, as well the density that is directly affected by the sample numbers of those points, are determined for the displayed mesh; producing a regular triangular grid sample model according to the 3D threads, in column 7 lines 42-45 ("The use of the complex data points allows the modeling system to incorporate into the wire frame mesh both the spatial features of the object..."); and outputting the reconstructed 3D model . It would have been obvious to one of ordinary skill in the art to combine the teachings of Lee et al. with Migdal et al. because this combination would provide efficient reconstruction of a 3D model through acquiring feature points, instead a large amount of mesh data, and producing a reconstructed 3D model from a regular grid formed based on the feature data.

Regarding claim 6, Lee et al. teaches that the 3D feature-lines in the build step are based on the exterior appearance and structure of the original 3D model on page 2 second paragraph lines 1-4 ("...a fast method applied to two kinds of input to get an animatable cloning of a person. A semiautomatic feature detection is described to get rough shape of a given face from orthogonal picture data or range data..."), and can be seen in the transition of Figure 1 from the range data to the feature extraction section.

Regarding claim 7, Lee et al. teaches searching the connection lines on page 3 section 2.2 first paragraph lines ("We provide a semi-automatic feature point extraction method with a user interface... Above the conventional snake, we add some more functions called as structure snake, which is useful to make correspondences between points on a front view and ones on a side."), where it is described that the feature points are detected from the input data, therefore all the feature points are searched and then utilized to construct closed zones as the loops which are shown in Figure 3(b). Though Lee et al. teaches generated feature lines in Figures 3(b) and 4(b), Lee et al. fails to teach obtaining intersection points of the 3D feature-lines as the connection joints and recording the connection lines connecting to each connection joint. Migdal et al. teaches obtaining intersection points of the 3D feature-lines as the connection joints in column 12 lines 27-41 ("For 3D mesh constructions, FIG. 1 depicts a plurality of data points 2a (which can be a "cloud of points" or a mesh with some connectivity information...the plurality of data points 2a will also have connectivity or other additional data associated with it..."), where it is described that all the points comprised in mesh are obtained along with their respective connectivity information, which would describe how the points and their respective connection lines are interconnected. Migdal et al. also teaches recording the connection lines connecting to each connection joint in column 9 lines 26-29 ("...the "connectivity" of the mesh or the interconnection of the edges...") and in column 19 lines 35-40 ("The mesh data structure 144 maintains information for each mesh face, its vertices, edges and neighboring faces. The mesh data structure 144 contains a plurality of face records (e.g., 145)..."), where it is described that the connection lines, or edges are stored for the mesh. The motivation to combine the teachings of Lee et al. and Migdal et al. is equivalent to the motivation of claim 5.

Regarding claim 8, Lee et al. illustrates combined closed regular triangular grids of the loops as the regular triangular grid sample model in Figure 5(a). Lee et al. fails to teach constructing regular triangular grids in each loop according to the sample numbers of each connection line in the determining step, in column 27 lines 22-26 ("...incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density..."), where it is described that triangular grids are continually formed by inserting points into the grid based on the density or sample numbers of the mesh, as also shown in the transition from Figures 2c to 2d. The motivation to combine the teachings of Lee et al. and Migdal et al. is equivalent to the motivation of claim 5.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Said Broome whose telephone number is (571)272-2931. The examiner can normally be reached on 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S. Broome SB
5/22/06

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